DOCUMENT RESUME

ED 057 544 EC 040 882

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TITLE The Use of Behavior Modification Techniques with a Special Classroom for Children with Behavior Problems. Monograph No. 2.
INSTITUTION Oregon Univ., Eugene.
SPONS AGENCY Office of Education (DHEW), Washington, D.C. Bureau of Educational Personnel Development.
PUB DATE Jul 71
GRANT OEG-0-9-470117-3664(721)
NOTE 74p.

EDRS PRICE MF-$0.65 HC-$3.29
DESCRIPTORS *Behavior Change; Behavior Problems; *Educationally Disadvantaged; *Elementary School Students; *Exceptional Child Research; Operant Conditioning; Reinforcement; *Special Classes

ABSTRACT

The use of operant conditioning techniques in a classroom for educationally handicapped children was studied to determine if it would result in a reduction of maladaptive behavior. The subjects consisted of an experimental and a control group of elementary school children, with an IQ range in the experimental class of 88 to 119. The experimental period required 22 consecutive school days. During the experimental hour, the observer watched the class from one corner of the room where he operated a stop clock. If no unapproved behavior occurred during a specific time interval while the clock was running, the class was given one penny. If any maladaptive behavior did occur, the clock was stopped, reset and started again when all behavior was acceptable. The students were allowed to buy candy, put their money in a bank, or take it home with them. Results indicated that there was a significant reduction in the occurrence of maladaptive behavior in the experimental classroom, that background noise was reduced significantly, that there was a significant decrease in teacher reinforcement of maladaptive behavior, that there was a significant reduction of hyperactive and maladaptive behavior in the total school setting, and that similar findings did not obtain in the control class. School work of all experimental children showed substantial improvement. (Author/CB)

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MONOGRAPH NO. 2
USOE GRANT NO. OEG-0-9-470117-3664(721) OE-BEPD

ED057544

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EC 040 882

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE

Bureau of Educational Personnel Development
Division of School Programs
Special Education Branch

ED057544

COVER PAGE

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THE USE OF BEHAVIOR MODIFICATION TECHNIQUES WITH A SPECIAL CLASSROOM FOR CHILDREN WITH BEHAVIOR PROBLEMS

Project Title

Experienced Teacher Fellowship Program

in Learning and Behavior Problems

1971

U. S. Department of Health, Education, and Welfare

Office of Education

Bureau of Educational Personnel Development

Division of School Programs

Special Education Branch

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THE USE OF BEHAVIOR MODIFICATION TECHNIQUES WITH A SPECIAL CLASSROOM FOR CHILDREN WITH BEHAVIOR PROBLEMS

U.S.O.E. Grant No. OEG-0-9-470117-3664(721)

by

James M. Hotchkiss
Project Director

1971

The research reported herein was performed pursuant to a grant with the Office of Education, U. S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

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Within the last 25 years there has been a steadily increasing number of studies demonstrating the utility of various operant conditioning techniques in changing human behavior. While a large majority of studies have been done in laboratory settings using the traditional one-to-one therapist-patient relationship, a few have been done in which individual children have been treated effectively within a classroom setting (Ullman and Krasner, 1965, Krasner and Ullman, 1965; Staats, 1964). While it has been demonstrated that behavioral techniques are highly effective with individuals on a one-to-one basis and in classrooms where the student-faculty ratio was very low, they had not been shown to be effective or applicable in public school classrooms with large numbers of students in which only one teacher or adult was present.

Zimmerman and Zimmerman (1962) used operant conditioning techniques with two 11 year old (in special class) boys. The first experiment was with a boy who could not spell, who demanded an excessive amount of the teacher's time and attention, and who was also a behavior problem in the classroom. The operant technique applied was to completely withdraw any attention when maladaptive behavior occurred. This procedure was first done with spelling. When asked to spell a word on the board the boy would spell it many incorrect ways, waiting for the teacher to coach him. The teacher sat at his desk, busy with other work, until the boy had finally got the word correct whereupon he would then give the boy social approval and attention. Within a month spelling errors

were reduced to almost zero. To shape other classroom behavior, attention in the form of smiling, talking, or physical proximity was given only after the emission of desired behavior. Maladaptive behavior had declined significantly at the end of a month of treatment.

The second student was a boy who displayed severe temper tantrums and often had to be carried to class by attendants. Treatment was similar to that of Williams (1959) and Hart, Allen, Buell, Harris and Wolf (1964). The operant procedure was to completely ignore and not reinforce any behavior during a temper tantrum. The teacher sat at his desk and waited until all crying had stopped and then aided the boy. The first day the tantrum lasted approximately three minutes, then a crying spell of five minutes more occurred before the boy was given any attention. The tantrums extinguished "within a few weeks." The teacher reported other behavior improved as the tantrums decreased.

Bijou (1965), in the main address to the 43rd Council for Exceptional Children convention reported on the results of his studies using operant techniques with retarded children in a special classroom over a three year period. He stated that his results show that with operant conditioning techniques the retarded child can learn academic subjects far beyond what was formerly thought possible. The teacher in this situation is viewed as one who is attempting to bring forth strengths and maintain desired behavior. He states that the optimum classroom situation is one that is arranged so that the child develops skills, gains new knowledge, and learns how to learn better. This is best accomplished by giving (a) immediate knowledge of results and

(b) programmed instruction techniques. His teaching philosophy and methods were all programmed to meet these ends (Birnbrauer, Bijou, Wolf, Kidder, and Tague, 1965; 1966).

One of the studies in the series discussed by Bijou that has particular relevance to the present investigation was study of token reinforcement for behavior by Birnbrauer, Wolf, Kidder, and Tague (1965). The subjects were mentally retarded special class children 8 to 14 years of age and 50 to 70 IQ. The class procedure was to reward performance in an experimental programmed classroom with knowledge of results, verbal approval, and tokens. The tokens were always given with verbal comments of approval and consisted of check marks that could be exchanged for candies, toys, or money at the end of the day. To determine that token reinforcement was essential to the relatively high levels of accuracy and rates of studying maintained by the retarded pupils, tokens were not dispensed for a period of at least 21 days and then were reinstated. Daily records of items completed, percentage of errors, and disruptive behavior were kept. During the no-token period three general patterns of results were obtained: (1) Five of the 15 pupils showed no measurable change in performance. (2) Six pupils increased either markedly in over-all percentage of errors or sufficiently to reduce progress in the programs. (3) Four pupils showed an increase in percentage of errors, a decline (or considerable variability) in amount of studying, and an increase in disruptive behavior. Baseline performance was recovered in these 10 pupils when token reinforcement was reinstated.

Other support for the above results indicating that sometimes verbal reinforcement alone is not adequate are the results of the study of Levin and Simmons (1962a, 1962b). They found that praise alone was actually aversive for some emotionally disturbed children and did not serve as an accelerating consequence. When given only verbal praise for a specific approved behavior, it was found that these children emitted drastically fewer responses. The authors stated that using praise as an accelerating consequence is a goal and that teachers must attempt to modify children's behavior so that it will come under the control of normal consequences. This effect is what Birnbrauer et al. (1965) were demonstrating--that part of the training of special children must consist of coupling concrete rewards that are known to be reinforcing with verbal rewards that are neutral or even aversive · and then arranging the environment so that verbal rewards become reinforcing through stimulus generalization.

Quay, Werry, McQueen, and Sprague (1966), addressing themselves to this topic said:

> . . . It therefore appears that in the early stages of retraining the agressive, unsocialized child, it may be necessary to utilize reinforcers of a fairly concrete nature, such as candy, trinkets, and toys. However, the dispensing of more primary rewards ought to be paired deliberately with social reinforcers, such as praise and approving gestures, to facilitate the development of responsivity to more usual reinforcers. (p. 512)

They devised an experiment utilizing operant techniques to teach five children in the same classroom to pay attention to the teacher. After determining a baseline for maladaptive behavior, a box was placed on each child's desk. The children were told that if they were paying

attention to the teacher a light would go on from time to time and they would receive one piece of candy for each light flash at the end of the period or activity. Reinforcement was on a fixed ratio schedule of 1:5. Results after 52 days "suggest that this method is, indeed, having some effect (p. 513.)" Whether any other reinforcement such as teacher approval was given was not indicated. In another part of the same experiment a child was taught the alphabet in 12 ten minute sessions. Here the child was shifted from a primary reinforcement--candy, to a symbolic reward--poker chips. The chips were exchanged later for candy. It appears to this writer that the first part of the experiment would have yielded better results had the reinforcement schedule been 100 per cent at the start and then switched to the ratio schedule once the behavior was under the control of the E.

The final study to be reviewed was done by Patterson, Jones, Whittier, and Wright (1965). This study is of particular importance because the present investigation is to a large extent an attempt to extend the operant procedures used with a single boy to an entire classroom of disturbed children. Patterson et al. hypothesized that there was a curvilinear relationship between the activity levels of a child and the acquisition of social behavior; that up to moderately high levels of activity the child's behavior will bring about acceptable responses from other people but that extremely high rates of behavior are aversive to other people, hence the reactions from the culture are likely to be punitive. In this situation the child exhibiting hyperactive behavior would be likely to be punished even when he is displaying

socially acceptable behavior.

The two subjects were both 10 years old and both had medically diagnosed brain damage. Both were also described as very hyperactive. One subject was the experimental S and one the control S. Observations of the behavior of the two children were made in the classroom setting, from an observational booth adjoining the classroom and provided data on the frequency of occurrence of the following high rates of responses: walking, talking, distraction, and wiggling. Each child was observed for a minimum of ten minutes a day, four days a week. Following several weeks of baseline observation, the conditioning procedure was begun with the experimental subject in the classroom. During each time interval in which one of the high rate responses did not occur, S received an auditory stimulus which had been previously paired with the delivery of candy and pennies. The stimulus was dispensed by a radio device through an earphone worn by the subject. At the end of each conditioning trial, S received whatever candy or pennies he had "earned." The control subject showed no significant change in frequency of occurrence of the high rate responses during the three month period, while the experimental subject showed a significant decrease in nonattending behaviors. This reduction in rate was maintained over a four-week extinction period.

In their discussion they hypothesized that the importance of any change in behavior lay in the effect it produced on the reactions of the social culture. They believed that in future programs it would be important to arrange a hierarchy of responses which would lead to the

child being ignored or punished by the social culture for emitting maladaptive behavior. A provision of just such a social culture was one of the objectives of the present investigation.

Purpose of the Study

The purpose of the present study was to explore the applicability of operant conditioning techniques, now in intensive use in the therapy of individuals, to class groups; to determine whether operant procedures could be feasible with a class as a whole; and to see whether a worthwhile decrease in the occurrence of maladaptive behaviors and an increase in socially acceptable behaviors would result. These purposes can be expressed in the form of questions:

1. Can the general method of operant conditioning be applied to a class as a whole?
2. Can controls over the entire class be exercised by employment of operant procedures?
3. Can improvements in behavior be brought about by the use of operant techniques?
   a. Will there be a decrease in the occurrence of maladaptive behavior?
   b. Will there be an increase in adaptive behavior?
   c. Will there be a decrease in the activity level of the classroom?
4. Will any new or different behavioral symptoms appear during or after the experimental period?

5. Will any change in behavior observed in the classroom generalize to outside situations? In other words, will maladaptive behavior be reduced and adaptive behavior increased outside the classroom?

Hypotheses

The general hypothesis was that operant conditioning techniques, similar to those now in intensive use in the therapy of individuals, could be extended to an entire class of educationally handicapped children and could improve classroom behavior.

In as much as this hypothesis was general in nature it could not be specifically tested. It did, however, provide the basis for the development of the following singular hypotheses which were tested:

Hypothesis 1: The use of operant techniques will reduce the occurrence of maladaptive behavior in a classroom of educationally handicapped children.

Hypothesis 2: The use of operant techniques in a classroom for educationally handicapped children will reduce the background noise level generated by the pupils.

Hypothesis 3: The use of operant techniques by a classroom teacher will result in less teacher reinforcement of maladaptive student behavior of educationally handicapped children.

The next hypothesis was developed to assess the generalization of classroom behavior to the total school setting--from the time the children left home in the morning on the school bus to the time that

that same bus dropped them off in the afternoon.

Hypothesis 4: The use of operant techniques will reduce the occurrence of maladaptive and hyperactive behavior in the total school environment.

The Subjects

The study was done in a lower middle-class neighborhood elementary school in California. The school had an enrollment of 458 children in grades Kindergarten through 6 at the time of the study. There were 26 children enrolled in three classes for educationally handicapped (EH) children. The EH children were not mixed with regular students for any playground activities, assemblies, or other school functions.

The 16 children included in this study were all students in two of the three classes for EH children at the school. The classes were used as they were found; it was not possible to match students in the experimental class with contrast class students and no interclass rearrangement of children was attempted for the purposes of this study. The experimental class was selected for this study by the psychological, guidance, and administrative staffs of the school district and the area school district which is a cooperative special education district of which the school district is a member. It was the opinion of these persons that this particular class presented the most serious behavioral and classroom control problems of any EH class in the area district. The contrast class was believed to be

a "typical" group of EH children with an excellent teacher and an above-average educational program.

The children in the classes had been placed in the Educationally Handicapped Program in strict accordance with California State Law as specified in Assembly Bill 464, 1963. This Code defines as educationally handicapped (EH) any child:

> . . . who by reason of marked learning problems, or behavioral problems or a combination thereof, cannot receive the reasonable benefit of ordinary education facilities; but who are not also handicapped by mental retardation or obvious physical disabilities for which special programs are already provided elsewhere in the Code. (Education Code Section 6750, p. 336)

Administrative Code Section 221 further defines an EH minor as:

> . . . a minor described in Education Code Section 6750 (above) whose learning problems are associated with a behavioral disorder or a neurological handicap or a combination thereof, and who exhibits a considerable discrepancy between ability and achievement. (p. 118.15)

The IQ range of the experimental class was 88 to 119; the contrast class was 84 to 134. The age range of the experimental class was 8.8 to 10.6 years; the contrast class was 7.3 to 10.10 years. Older children were two or more years retarded in learning; younger children had been non-achievers before placement.

The experimental class consisted of nine boys at the start of the experiment. One boy was dropped from the experiment when his family moved from the district and his data are not included in class or inter-class computations. The age range was from 8.8 to 10.6 years; the mean age of the class was 9.5. The IQ range was from 88 to 119; the class mean was 98. One boy was on a low second-grade level academically, all

others were at a first-grade level. Six of the eight boys were, or had been, under medication for hyperactive behavior. Three of the eight had been medically diagnosed as having some form of cerebral dysfunction or impairment. All were considered to be hyperactive and all were Caucasian. The range of time since placement in the EH program was from 2 months to 30 months; the class mean was 13.2 months. A decision had been made, before the experimenter approached the school district for permission to do this study, to exclude three of the boys from the program because of their uncontrollable behavior. They were specifically retained in school for purposes of this study. Experimental class data are presented in Table 1.

The contrast class consisted of eight children at the start of the study. Five were boys, and three were girls. One girl entered the class during the study but her data are not included in class and interclass analyses. The age range was 7.3 to 10.10; the class mean was 8.7 years. The IQ range was from 84 to 134; the class mean was 103. One boy was achieving academically on a second-grade level, five children were on a first-grade level and three were on a kindergarten level by teacher estimate. Only one child had a definite medical finding of neurological disorder and five were under some type of medication for hyperactive behavior or had been under medication. The range of time since placement in the EH program was from 1 month to 20 months; the class mean was 9.7 months. All children were Caucasian. Contrast class data are shown in Table 2.

TABLE I
SUMMARY OF DATA OF CHILDREN IN EXPERIMENTAL CLASS

Student	E-1	E-2	E-3	E-4	E-5	E-6	E-7	E-8	E-9	Av.
Sex	M	M	M	M	M	M	M	M	M	
Chronological Age—years	9-6	8-8	8-8	10-6	9-9	9-5	10-5	9-7	9-5	9-5
Chronological Age—months	114	104	104	126	116	113	125	115	113	114
I.Q. Score	91	97	99	104	119	90	104	90	88	98
Wide Range Achiev. Test										
Reading Grade	2.6	1.4	1.8	1.2	1.8	1.2	1.9	1.1	1.9	
Spelling Grade	2.2	1.0	1.7	1.0	1.9	1.3	--	1.3	1.7	
Arithmetic Grade	2.5	1.5	1.6	1.8	2.2	1.5	2.7	2.0	2.2	
Under Medication	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	
Medical Diagnosis of Neurological Dysfunction	Yes	No	No	No	No	Yes	Yes	No	Yes	
Hyperactive Behavior	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Months since Placement in EH Program	14	11	2	6	14	30	14	14.	14	13.2
Race	C	C	C	C	C	C	C	C	C	

TABLE 2
SUMMARY OF DATA OF CHILDREN IN CONTRAST CLASS

Student	C-1	C-2	C-3	C-4	C-5	C-6	C-7	C-8	C-9	Av.
Sex	M	M	M	M	F	F	M	F	F	
Chronological Age–years	8-6	8-6	8-11	7-3	8-7	10-10	10-5	7-6	7-8	8-7
Chronological Age–months	102	102	107	87	103	130	125	90	92	104
I.Q. Score	134	100	132	95	84	88	98	93	102	103
Wide Range Achiev. Test										
Reading Grade	1.8	1.4	2.0	1.4	---	1.4	1.1	1.1	---	
Spelling Grade	1.8	1.5	1.7	---	---	---	---	---	---	
Arithmetic Grade	2.5	2.2	3.1	1.8	---	2.5	2.3	---	---	
Under Medication	No	No	Yes	Yes	No	Yes	No	Yes	No	
Medical Diagnosis of Neurological Dysfunction	No	No	No	No	Yes	No	No	No	No	
Hyperactive Behavior	Yes	No	Yes	Yes	No	No	No	Yes	No	
Months since Placement in EH Program	20	19	13	2	17	3	12	1	0	9.7
Race	C	C	C	C	C	C	C	C	C	

Description of Rating Instruments Used

The Activity Check List

The Activity Check List (Figure 1) was selected for this study because it provided a method by which each child could be observed and rated on seven different types of bodily and verbal activity. The types of behavior observed in the check list are described below:

Movements directed toward the body: e.g., wringing of hands, rubbing eyes, swinging arms, leaning forward in the chair, scratching or stretching.

Movements in chair: e.g., shuffling of chair, sliding back and forth in chair, twisting of body in chair, or leaning clear out of chair so that buttocks no longer rest on it.

Distraction: e.g., looking over toward a noise, toward someone who has just entered the room (unless the teacher also looks up), out of the window, or off into space.

Gross movements of legs and feet: e.g., pumping of leg, wiggling of feet, or crossing of legs or other shift of their position.

Fiddling: Arm and hand movement directed toward objects: activities of the hand(s) that interfere with school work or assigned activities, e.g., stroking the desk, fingering the box of color crayons.

Communicative or quasi-communicative activity interfering with schoolwork: e.g., talking to self, pointing, laughing, attempting to attract someone's attention, talking to someone without permission.

Walking or standing that was not encouraged or subsequently approved of by the teacher. (Patterson, Jones, Whittier, and Wright, 1965)

FIGURE I
EXPERIMENTAL PERIOD INDIVIDUAL TALLY SHEET

No.	Date	Day	Teacher	Observer				
NAME	1 MOVEMENTS DIRECTED TOWARDS BODY	2 MOVEMENTS IN CHAIR	3 DISTRACTION	4 GROSS MOVEMENTS OF LEGS AND FEET	5 FIDDLING	6 COMMUNICATIVE OR QUASI-COMMUNICATIVE ACTIVITY	7 WALKING OR STANDING	TOTAL
TOTAL								

Each of the judges rating the children in a class would independently observe a single child for 10 seconds, then check on the Activity Check List all of the above activities, if any, he had observed the child commit. Activity that had teacher approval or was subsequently approved by the teacher was not included. The observer would then go on to the next child and repeat the same procedure. Each child was observed individually over 100 times during a three day period before the start of the experimental period and for approximately the same amount of observations following the experiment. The total number of nonteacher-approved activities observed in each child were then divided by the total number of times that that child had been observed. The number thus obtained was the Activity Level Average (ALA).

To establish the reliability of the instrument, four observers observed two hyperactive children over a one-week period. They rated the children on the Check List. The total frequency of nonattending behavior patterns were summed for eight 10 minute intervals for each pair who had been observing the experimental subject. When using total frequency of occurrence on nonattending behavior the correlation between one pair of observers was 0.91. Anderson (1964) found a reliability of 92 percent, 82 percent, and 72 percent with pairs of three observers when observing the same child.

Inter-rater agreement for this study was established by requiring the three judges to observe the children in a classroom simultaneously. The judges would all observe one child at a time, rate him, then move on to another child. Thus, each child in the class was observed 20

separate times by each of the judges. There was a correlation of 0.84 between judges 1 and 12; 0.82 between 1 and 3; and a correlation of 0.80 between judges 2 and 3.

The Burks' Behavior Rating Scale

The Burks' Behavior Rating Scale (Figure 2) was used in this study because it was designed as a scale to rate hyperactive and maladaptive behavior. Also, it was one of the basic instruments used for the referral, screening, and placement of children in the special classes in many districts in California including the one where this study was conducted. The classroom teachers involved in the study were required to rate each child in their class on the instrument yearly, and were thoroughly familiar with administering it.

The scale consisted of three sections: (1) Vegetative-Autonomic, e.g., hyperactiveness, restlessness, erratic, explosive behaviors; (2) Perceptual-Discriminative, e.g., poor in reading, confusion in spelling and writing; and (3) Social-Emotional, e.g., demanding much attention, shallow feeling, cries, etc.

There were 28 statements describing behavior relative to the above headings. Teachers were to rate each child on each statement according to the following five point scale:

1. You have not noticed this behavior at all.
2. You have noticed the behavior to a slight degree.
3. You have noticed the behavior to a considerable degree.
4. You have noticed the behavior to a large degree.
5. You have noticed the behavior to a very large degree.

FIGURE 2

23:T-0
3-6

APPENDIX A
BURKS' BEHAVIOR RATING SCALE

Name _____ Age _____ Grade _____

Teacher _____ School _____ Date _____

Please rate each and every statement by putting an X in the appropriate square after the statement. The squares are numbered from 1 to 5 and represent the degree to which you have noticed the described behavior. The bases for making a judgment are given below:

(1) You have not noticed this behavior at all.
(2) You have noticed the behavior to a slight degree.
(3) You have noticed the behavior to a considerable degree.
(4) You have noticed the behavior to a large degree.
(5) You have noticed the behavior to a very large degree.

Rating Scale (1) (2) (3) (4) (5)

Vegetative-Autonomic

1. Hyperactive and restless
2. Erratic, flighty, or scattered behavior
3. Easily distracted, lacks continuity of effort and perseverance
4. Behavior goes in cycles
5. Quality of work may vary from day to day
6. Daydreaming, alternating with hyperactivity
7. Explosive and unpredictable behavior
8. Cannot seem to control self (will speak out or jump out of seat)
9. Poor coordination in large muscle activities (games, etc.)

Perceptual-Discriminative

10. Confusion in spelling and writing
11. Inclined to become confused in number processes; gives illogical responses
12. Reading is poor
13. Lacks a variety of responses; repeats himself in many situations
14. Upset by changes in routine
15. Confused in following directions
16. Confused and apprehensive about rightness of response; indecisive
17. Classroom comments are often "off the track" or peculiar
18. Difficulty reasoning things out logically with others

Social-Emotional

19. Demands much attention
20. Tends to be destructive especially of the work of others
21. Many evidences of stubborn uncooperative behavior
22. Often withdraws quickly from group activities, prefers to work by self
23. Constant difficulty with other children and/or adults (apparently purposeless)
24. Shallow feeling for others
25. Cries often and easily
26. Often more confused by punishment
27. Seems generally unhappy
28. Often tells bizarre stories

Teachers rated the child in their classes both before and following the experimental period. Approximately five minutes was required to rate each child.

The scale was developed and validated for use by classroom teachers by Harold F. Burks (1955) for use in his doctoral dissertation and has since been adopted for use by the Los Angeles County Schools Division of Research and Guidance. It is presently used in many California school districts as a standard screening tool for the identification of EH children.

The Teacher Observation Form

The Teacher Observation Form was developed for use in this study. The three judges were asked to observe and note on the form all instances of teacher reaction or interaction with any student(s). Teacher activities that strengthened adaptive or socially acceptable behavior were listed in one column, while activities that strengthened maladaptive behavior or reduced adaptive behavior were listed in the second column. Examples of socially acceptable behavior were: responding to a child who was sitting quietly with his hand up, complimenting a child for a job well done, and praising a child in front of his peers; while examples of the latter category were: replying to a shouted question, talking to a boy who left the room without permission, and not responding to a child who was sitting quietly with his hand up. These ratings were made over a three day period both before and after the experimental period.

The Sound Level Meter

A General Radio Type 759 Sound Level Meter was used to record the level of background noise in both the experimental and contrast classrooms. The meter was placed in a corner of each classroom where it could be observed and was located in the same place in the pre- and post-experimental periods (See Figure 4 and 5). Sound level readings were taken exactly at five-minute intervals over a three day period both before and after the experimental period.

Parent Information

Information about the behavior of the children in the experimental program in their home and community environment was obtained by the following methods:

The Parent Questionnaire: This form was prepared for use in this study. Its purpose was to obtain from the parents of children in the experimental class an evaluation of the child's behavior at home and in the community. The parent was requested to note in particular any behavioral change observed from the onset of the experimental period to the time when the questionnaire was completed. The form was specifically designed to evoke observations of any new unfavorable symptoms which might have appeared since the start of the study.

Parent-Group Meetings: Parents with children in the three EH classes at the school met together one evening a month. The purpose of the study was explained to parents before the study was begun. After the completion of the study the writer interviewed each parent and

FIGURE 3
PARENT QUESTIONNAIRE

Dear Parent:

This is a follow-up survey of parent opinion of any behavior changes or other symptoms that you may have noticed in your child over the last two months. Please answer each question as fully as possible.

1. Have you noticed any changes in your child's behavior as a result of his participation in the study?_____

2. Do you feel that your son has benefitted from his school experience as a subject in this study?_____

3. Please list any unfavorable effects of the study on your child's behavior.

_____

_____

_____

4. Has he developed any new behavior characteristics that you feel are undesirable?_____ If so, please list.

_____

_____

5. Has your child developed any new behavior characteristics that you feel are desirable?_____ If so, please list.

_____

_____

_____

6. Please comment, if you have not already done so, on the following:

a. Activity level_____

b. Relationships with brothers and/or sisters_____

_____

c. Attitude toward school_____

d. Attitude toward parents_____

Any further information that you can supply about your child's behavior over the last two months will be greatly appreciated.

_____

_____

_____

_____

recorded their comments and evaluations of their children's behavior in and out of school.

Impressions and Opinions of Administrative and Guidance Personnel of the School District

Administrators and guidance personnel of the cooperative education district who observed the class during the experimental program were requested to submit a written evaluation of the program.

Pre-Experimental Period Procedure

Judges

The three judges consisted of two doctoral students in Exceptional Children and the writer. One judge was a former school psychologist and all had had extensive work in evaluating emotionally disturbed and mentally retarded children and adults.

Classroom observation

The two classes were observed by the three judges over a three day period. Judges were located at tables at the side, and to the rear of each classroom where they were unobtrusive but could clearly see all children in the room. Judges alternated between classrooms, observing in each classroom for approximately the same amount of time and at approximately identical times on alternate days. The judges observed individual behavior of each child and indicated their observations on the Activity Check List in the manner previously described. Each judge also completed several random 15 minute observations of the classroom

teacher and recorded these on the Teacher Observation Form. One judge recorded the classroom noise level at exact five minute intervals from the Sound Level Meter which was placed on the floor by the judge's table.

The judges rated children and teachers independently, i.e., there was no attempt for two judges to observe the same child or teacher at the same time. The judges attempted to spend a similar time in each of the two classrooms over a three day observation period in the two observation periods.

Teacher ratings: Teachers were asked to rate each child on the Burks' Behavior Rating Scale before the start of the experimental period.

Instructions for the Experimental Class Teacher

Following the gathering of the pre-experimental period data the writer met with the experimental class teacher and discussed the purpose of the study in detail. The basic principles of operant conditioning were explained and she was advised on their application during the experimental period. For example, she was instructed to reward all adaptive behavior, such as working quietly, raising of hands, and sitting at the desk. When adaptive behavior such as this occurred, she was to compliment the child, notice him, smile at him, or otherwise verbally acknowledge her approval. She was further instructed to ignore all maladaptive behavior during the experimental period. She was not to answer a shouted question, talk to a boy who was out of his seat without permission, or pay attention to a boy who was not working.

Instructions for the Contrast Class Teacher

The contrast class teacher was not given any instructions. She was advised that the writer would be available to her for from one-half to one hour daily and that he would aid her in any way that she desired.

Daily Procedure in the Experimental Class

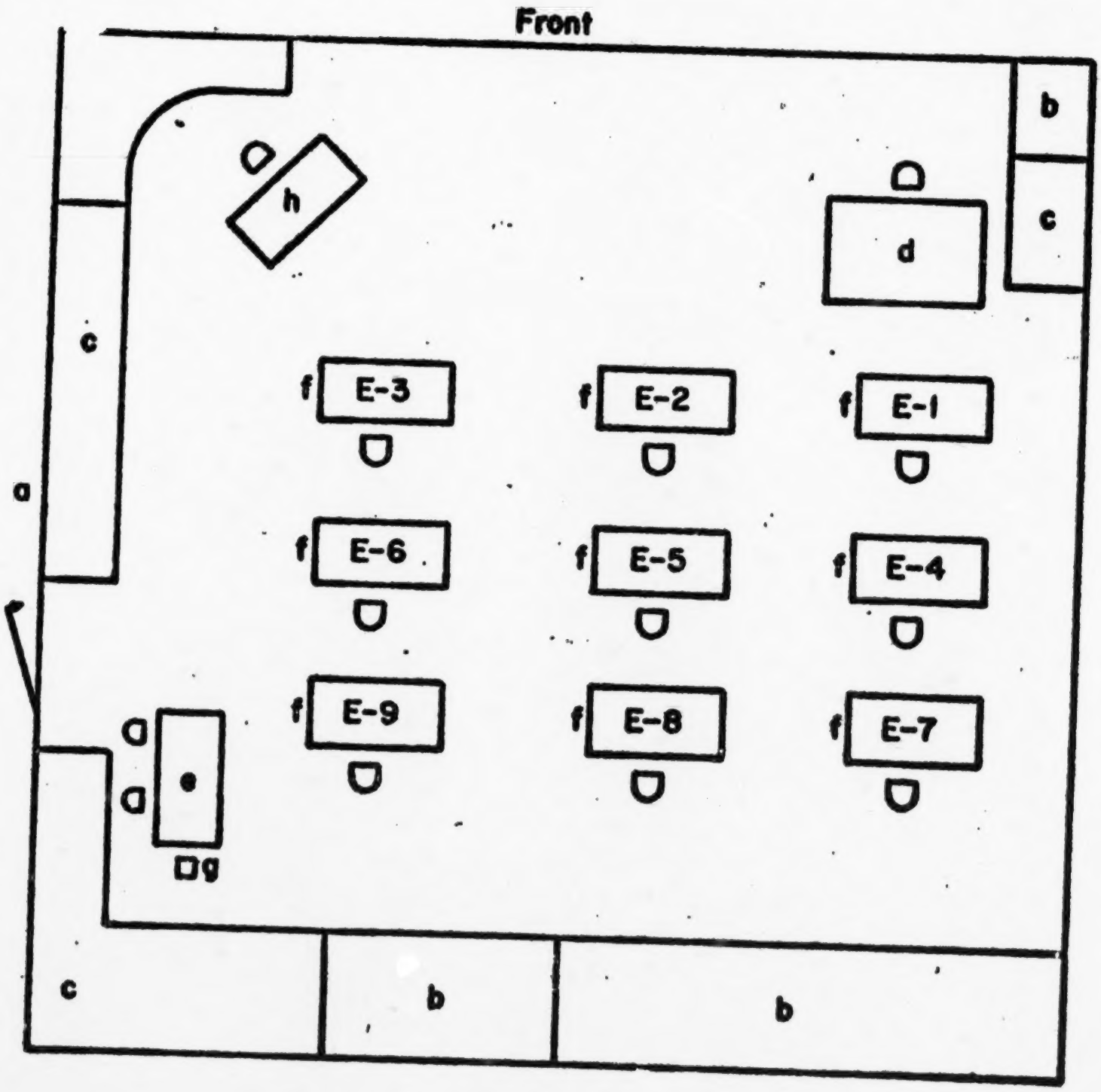
Physical Arrangement of the Classroom

The observation table (Figure 4, no. h) was located in the front and to the left side of the room where it could be clearly and easily seen by all subjects and on it were placed a CRA-LAB Model 172 Electric Interval Timer with an 8 inch dial, a half-quart jar with several stacks of poker chips, and a few samples of candy. The observer sat behind the desk where he could watch all children. Desks of the children were evenly placed in three rows, three desks deep, facing the front of the room. The teacher's desk was located at the front and to the right hand side of the room. The arrangement of the experimental and contrast rooms is presented in Figures 4 and 5.

Selection of the Experimental Time Period

EH Children attended school from 8:00 a.m. to 12:00 noon. The experimental time period chosen was from 10:30 a.m. to 11:30 a.m. because no systematic classroom work or individual instruction had been possible during that time interval previous to the experimental period. It was the opinion of the teacher and the school principal that the children were most hyperactive and disruptive during this time and often

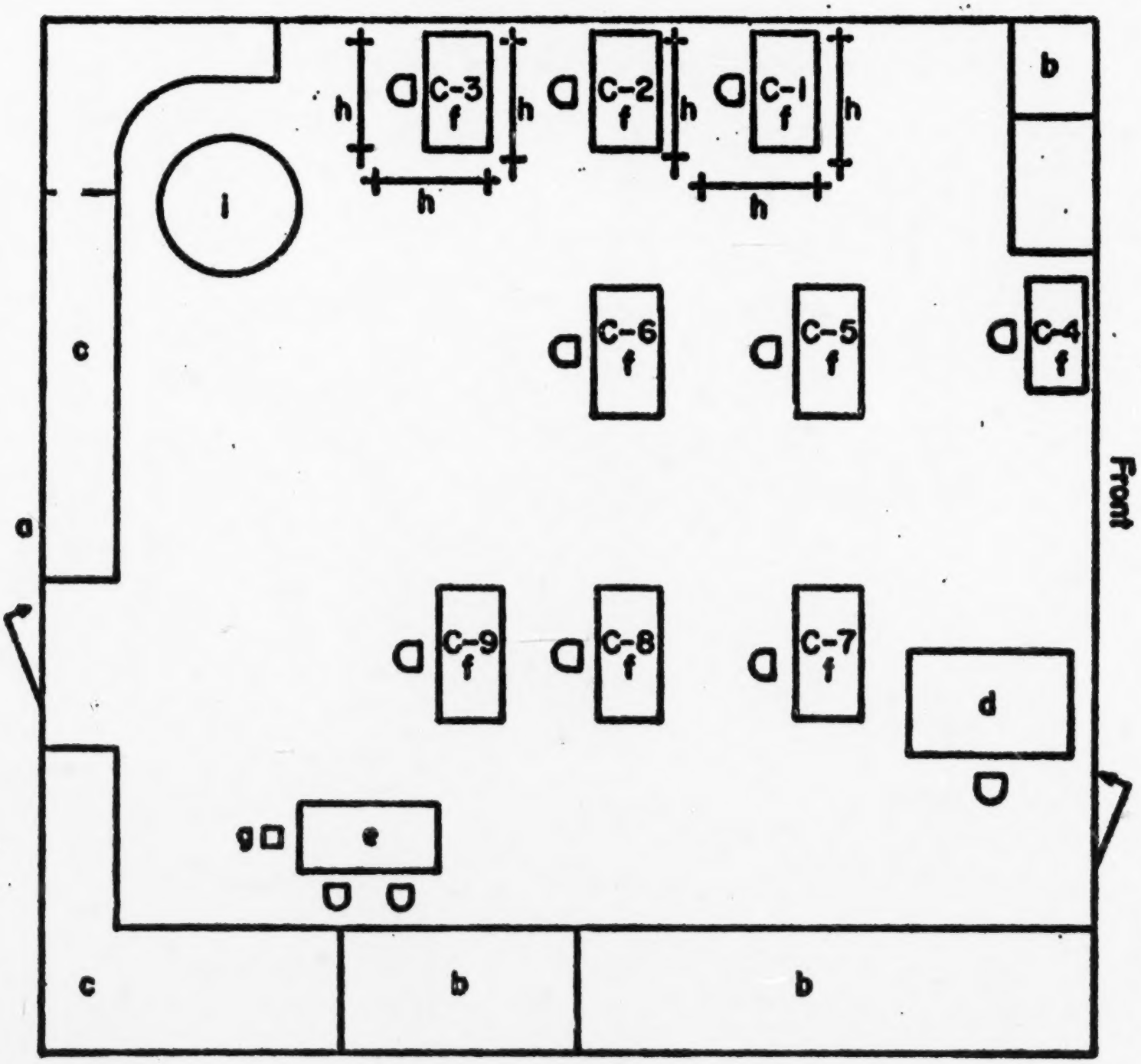
FIGURE 4
ARRANGEMENT OF THE EXPERIMENTAL ROOM



Legend

a. Windows
b. Clothes or storage closets
c. Window-level
d. Teacher's desk
e. Observation desk
f. Student tables
g. Sound level meter
h. Experimental period observation table

FIGURE 5
ARRANGEMENT OF THE CONTRAST ROOM



Legend

a. Windows
b. Clothes and storage closets
c. Window-level cabinets
d. Teacher's desk
e. Observation table
f. Student tables
g. Sound level meter
h. Partitions
i. Reading table

were unmanageable.

First Day Instructions to Children

At the start of the first daily experimental session the experimenter explained that he would be working with the class for the next month and that he was doing a special study for his university. He explained that he would be playing a game each day with the class and that they could win candy for being quiet and sitting in their seats during the time that they were playing the game. They were shown the electric timer and it was demonstrated to them several times until everyone understood how it worked. Next the poker chips and half-quart bottle were demonstrated and they were told that each time the timer got all the way to zero without being stopped they would receive one chip. The chip would be placed into the bottle and would not be removed until the end of the period. The experimenter carefully explained that any unapproved talking, moving about, or class disrupting behavior would cause the timer to be stopped and reset. If, at the end of the period there were more than 20 chips in the bottle, the chips would be evenly divided among all children present and could be immediately traded for candy. Several different kinds of candy were available and could be obtained by exchanging one chip for one piece of candy. If fewer than 20 chips were in the bottle, no candy would have been earned and the class would then receive nothing. Extra or left over chips were to be kept until Friday of each week and distributed separately from the regular Friday tokens.

It was carefully emphasized to the children that their teacher had nothing whatever to do with their winning or not winning any candy. She would not make them play, tell them to sit down, be quiet, or to behave in any way during the time the game was being played. Following this explanation, the first session was begun.

Procedure During the Experimental Hour

The experimenter would come into the classroom shortly before the end of the nutrition period and set up the observer's table in the manner previously described. When this was done he would announce that whenever the class was ready the game would begin. No further announcements were made. The clock was then started contingent on the first appropriate behavior of the whole class.

During the experimental period the observer watched the subjects, placed chips into the bottle as they were won, or reset the timer after any maladaptive behavior was observed. At no time did the experimenter teach the class or serve as a teacher during the experimental hour. He generally remained either behind the observer's table or at the rear of the room when a student was operating the timer.

On the eighth day of the experiment the "job" of class observation and operation of the timer and poker chips was delegated to one of the children. Thereafter, the position of class observer was highly sought after with boys signing up as far as two weeks in advance. Student-observers usually were more severe in their evaluation of infractions than the experimenter would have been and took their responsibility

most seriously. No reward other than an equal share of the class tokens was given.

At the conclusion of each daily period, the reward was immediately distributed to each child.

Beginning with the third week, the reward was changed from a piece of candy for each chip to one penny in money for each chip. A boy could then buy candy on display in the room, take his money home with him, or save it in a "bank" operated by the experimenter. By the termination of the experimental period all boys had bank accounts and were saving some or all of their winnings.

Time intervals. A 20 second time interval was used for the first 7 days, and was increased to 45 seconds for the 8th, 9th, and 10th days. The time interval was increased to one minute for the 11th, 12th, and 13th days. On the 14th and 15th days the interval was extended to five minutes. Thereafter and for the reaminder of the experiment, a time interval of 10 minutes was used. After the one-minute time interval was reached, the class was given one chip for each minute. In the 10-minute time interval, for example, the clock had to run uninterrupted for the full 10-minutes for 10 chips to be won. Any infraction occurring before the completion of the interval meant that all chips accumulated in that interval were lost and the time restarted at "10" again. Once the interval was completed and the timer had reached "0", the chips were immediately placed in the half-quart jar and could not be lost because of subsequent maladaptive behavior in the next time period.

Teacher Participation in the experimental class. During the

experimental period the teacher utilized operant conditioning techniques when working with the class. She actively sought opportunities to praise any student who was doing his assignment, sitting quietly, or exhibiting any other approved behavior. She was quick to respond to any subject who held up his hand while sitting quietly and would never fail to compliment him on his good behavior. She attempted to ignore completely all maladaptive behavior, refusing to answer a verbal call, talk with any subject who was out of his seat without permission. No student could obtain attention or talk with the teacher during the experimental period unless he was acting in a approved manner. No specific teaching directions were given to the teacher by the experimenter; she was encouraged to attempt any type of classwork that she desired during the experimental period.

Daily follow-up. Each afternoon the experimenter and the teacher discussed the progress of the class. Any instances of teacher reinforcement of maladaptive behavior that had been observed by the experimenter were discussed and suggestions of various methods to eliminate or decrease the maladaptive behavior were given.

Operant techniques used. Application of the free operant technique to pupil behavior was done by two distinct procedures: (1) social and verbal reinforcement and reward by the teacher for all adaptive and socially acceptable behavior while at the same time completely ignoring all maladaptive behavior and (2) use of the stop-clock and poker chips to reward, or pay for, appropriate adaptive motor and verbal behavior.

In the first category the teacher actively sought instances of

adaptive behavior to reward instantly (Maladaptive behavior, no longer securing the attention of the teacher or not resulting in the realization of any of the goals for which it had been emitted, tended to decrease.).

In the second case, the object of paying the entire class only if the behavior of all were acceptable was to remove peer reinforcement for previously approved disruptive and maladaptive behavior.

Since the class earned one penny for each chip and a single chip represented one minute of group adaptive behavior, the amount of money that could be won in the hour was rather limited. As the percentage of good behavior increased, the boys requested longer periods so that they could win more money. Consequently, the experimental period was lengthened to run from 10:15 to 11:50 in the third week, and from 10:00 to 11:50 in the last seven days.

Daily Procedure in the Contrast Class

The experimenter worked with the contrast class children daily from 9:00 to approximately 10:00. Half of the period was spent in the classroom where he served as a teacher-aide giving individual reading instruction to children selected daily by the teacher. The remainder of the time was spent on the playground with the class. The experimenter worked with these children exactly as he worked with the experimental class children, the only differences being that no group operant techniques were used and no critique of teacher reinforcement of student behavior was offered. In situations where his advice or opinion was

sought in respect to any problem or student, he responded with what he considered the best means or method of either coping with, or resolving, the problem.

Post-Experimental Period Observations

The post-experimental period observations were conducted by the same three judges who made the pre-experimental period observations. The same procedure was followed in rating the classes and pupils as had been used in the pre-experimental period.

The Hypotheses

Hypothesis I

This hypothesis in null form predicted that the use of operant techniques would not reduce the occurrence of maladaptive behavior of educationally handicapped children. The hypothesis was tested by matching Activity Level Average scores received in the pre-experimental period with those received in the post-experimental observation period and analyzing them by means of the *t*-test. When computed separately, the difference between the pre- and post-treatment rating of each judge was significant beyond the .001 level of confidence. When combined into a single comparison of all pre- and post-treatment Activity Level Averages, a *t* of 17.5 was obtained, far in excess of the .001 level of confidence.

A similar analysis was made of contrast group data. Results indicated no significant differences either in the ratings of single

TABLE 3. COMBINED RATINGS OF CLASSROOM ACTIVITY ON THE ACTIVITY CHECK LIST.

EXPERIMENTAL CLASS

Subject No.	Pre-Experimental Period			Post-Experimental Period			Difference $ALA_1 - ALA_2$
	No. Observed Activities [a]	No. Observations [b]	ALA_1	No. Observed Activities [a]	No. Observations [b]	ALA_2	
E-1	207	115	1.80	115	180	.64	1.16
E-2	220	133	1.65	80	180	.44	1.21
E-3	213	141	1.51	89	180	.49	1.02
E-4	278	140	1.99	118	180	.66	1.33
E-5	292	140	2.08	85	180	.47	1.61
E-6	216	138	1.56	78	180	.43	1.13
E-7	286	134	2.13	83	180	.46	1.67
E-8	275	132	2.08	118	178	.67	1.41
Class Av.	248	134	1.85	96	180	.53	1.32***
(t=17.5; SD_D=.216; SE_{M_D}=.075)							

CONTRAST CLASS

Subject No.	Pre-Experimental Period			Post-Experimental Period			Difference $ALA_1 - ALA_2$
	No. Observed Activities [a]	No. Observations [b]	ALA_1	No. Observed Activities [a]	No. Observations [b]	ALA_2	
C-1	134	96	1.40	137	90	1.52	-.12
C-2	256	106	2.42	205	90	2.28	.14
C-3	125	110	1.14	140	90	1.56	-.42
C-4	128	110	1.16	88	90	.98	.18
C-5	135	95	1.42	97	90	1.07	.35
C-6	166	115	1.44	116	90	1.29	.15
C-7	157	110	1.43	128	90	1.42	.01
C-8	185	110	1.68	199	90	2.21	-.53
Class	160	106	1.51	139	90	1.54	-.03*
(t=0.171; SD_D=.494; SE_{M_D}=.175)							

* No significant difference.

*** Significant at the .001 level of confidence.

a Number of maladaptive behaviors observed during 10-second observation periods.

b Number of 10-second time intervals during which the child was observed.

TABLE 4

STATISTICAL ANALYSIS OF SOUND LEVEL METER DATA OBTAINED IN PRE AND POST-EXPERIMENTAL PERIODS

	Pre-Experimental Period	Post Experimental Period	Mean Difference	t value
		Experimental Class		
Number of Readings	41	49		
Standard Deviation	5.6	2.2		
Mean of Reading	72.8	55.7	17.1	19.6***
		Contrast Class		
Number of Readings	48	46		
Standard Deviation	5.2	4.9		
Mean of Readings	65.7	67.9	-2.2	1.6*

* No significant difference between means.
*** Significant at the .001 level of confidence.

judges or the combined ratings.

Thus the null hypothesis (HO_2) was rejected at the .001 level of confidence (See Table 3 and Figure 6).

Hypothesis II

This hypothesis in null form predicted that operant conditioning techniques would not reduce the background noise level of a class of educationally handicapped children. The hypothesis was tested by comparing the pre-experimental period sound level readings with the post-experimental period sound level readings of the same class and analyzing them by means of the t-test for uncorrelated means. Results for the experimental class showed that a mean difference of 17.1 decibels between pre- and post-experimental period was significant beyond the .001 level of confidence.

Analysis of readings taken in the contrast classroom show a mean increase (not significantly different) in sound level of 2.2 decibels.

Thus, the null hypothesis (HO_1) was rejected at the .001 level of confidence (See Table 4 and Figure 7).

Hypothesis III

This hypothesis in null form predicted that the use of operant techniques by a classroom teacher would not result in less teacher reinforcement of maladaptive student behavior. The hypothesis was tested by comparing the pre-experimental period ratings of teacher

FIGURE 6

COMPARISON OF PRE- AND POST-EXPERIMENTAL PERIOD ACTIVITY LEVEL AVERAGES OF EXPERIMENTAL AND CONTRAST CLASSES.

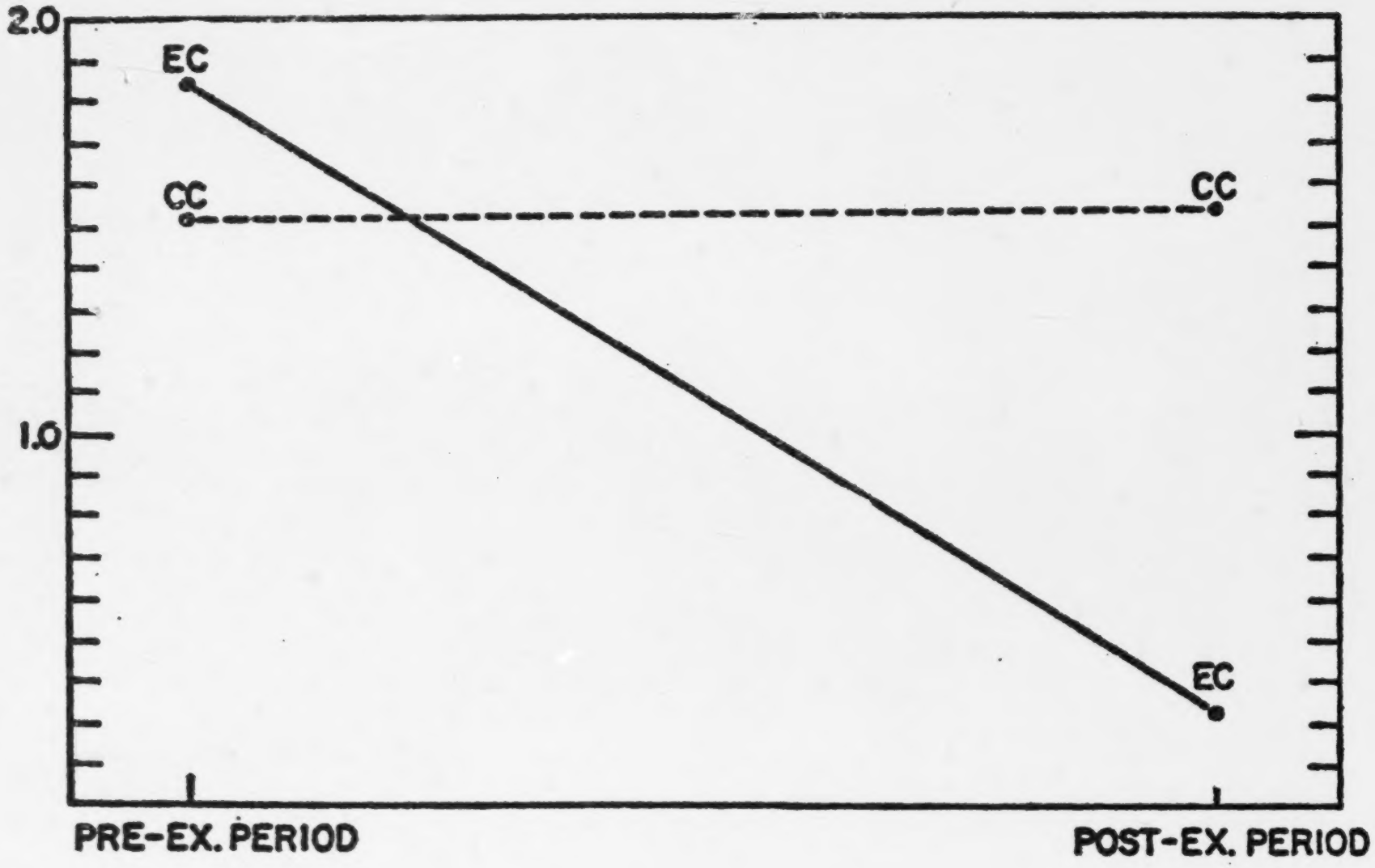
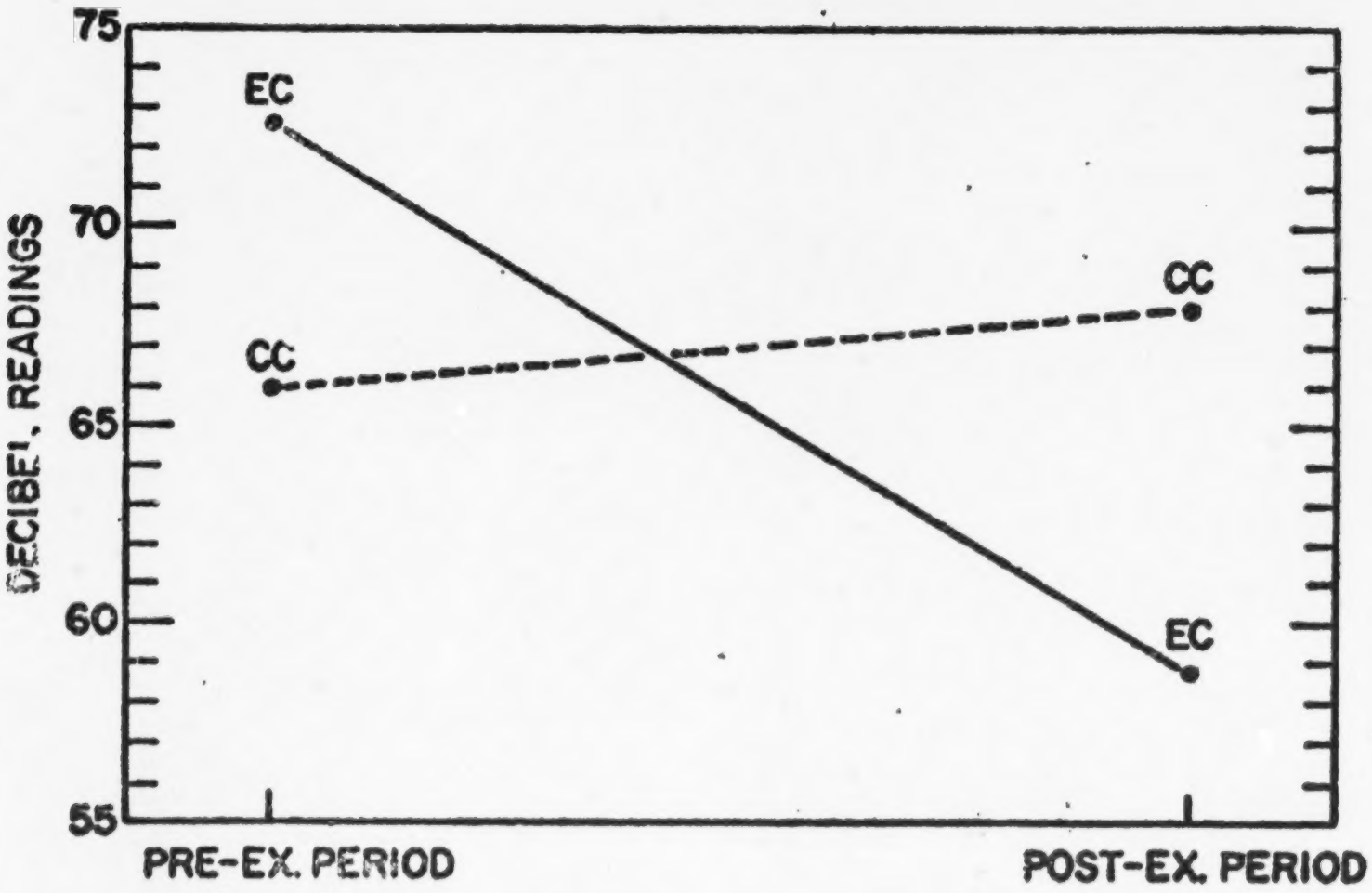


FIGURE 7

GRAPHIC ILLUSTRATION OF THE RELATIVE POSITION OF MEAN SOUND LEVEL METER READINGS OF THE EXPERIMENTAL AND CONTRAST ROOMS IN THE PRE- AND POST-EXPERIMENTAL PERIODS.



reinforcement of student behavior with the post-experimental period ratings. Results were analyzed by means of the Chi Square statistic. Data from the experimental class show that the difference between the pre-experimental and post-experimental period was highly significant (Chi Square 74.45 $>$ .001).

The data from the contrast classroom show that there were no significant differences between pre- and post-experimental observations of any of the judges.

The null hypothesis (HO_3) was rejected at the .001 level of confidence for the experimental class and accepted for the contrast class.

Hypothesis IV

This hypothesis in null form stated that there would be no reduction in the occurrence of maladaptive behavior in the over-all school environment as a result of the use of operant techniques. This hypothesis was tested by matching teacher ratings of individual student's behavior on the Burks' Behavior Rating Scale obtained before the start of the experimental period with ratings obtained after the experimental period. For the experimental class the mean difference between ratings was 33.6, which is highly significant ($\underline{t}$ = 8.29, 7 df $>$ .001).

The mean difference between pre- and post-experimental period ratings in the contrast class was 10 points, which is significant at the .05 level ($\underline{t}$ = 3.25, 7 df $.05 < .01$).

Thus the null hypothesis (HO_4) was rejected at the .001 level of

FIGURE 8

COMPARISON OF TEACHER EVALUATIONS ON BURK'S BEHAVIOR RATING SCALE.

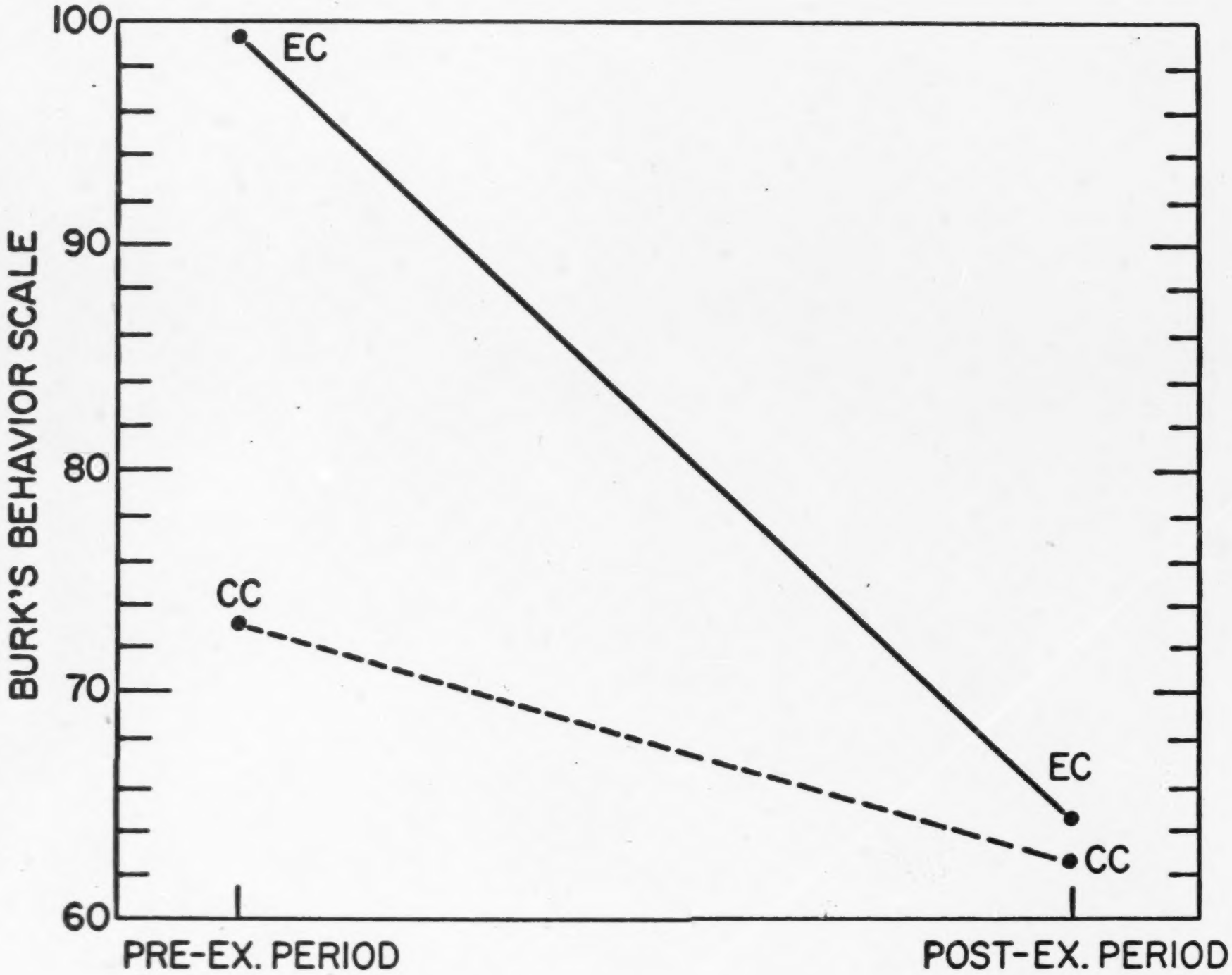


TABLE 5

COMPARISON OF TEACHER REINFORCEMENT OF ADAPTIVE AND MALADAPTIVE SUBJECT BEHAVIOR IN PRE- AND POST-EXPERIMENTAL PERIOD

	Experimental Class Total	Contrast Class Total
Pre-Experimental Period		
Total Reinforcement of Adaptive Behavior	61	99
Total Reinforcement of Maladaptive Behavior	88	92
Post-Experimental Period		
Total Reinforcement of Adaptive Behavior	82	79
Total Reinforcement of Maladaptive Behavior	0	67
Chi Square	74***	0.1*

* No significant difference
*** Significant at the .001 level of confidence

TABLE 6
TEACHER EVALUATIONS
BURKS' BEHAVIOR RATING SCALE

Student No:	Pre-Experimental Period Score	Post-Experimental Period Score	Difference (Pre-Post)
	Experimental Class		
E-1	92	73	19
E-2	103	73	30
E-3	93	53	40
E-4	76	57	18
E-5	95	65	30
E-6	107	65	42
E-7	116	65	51
E-8	111	73	38
Mean Score:	99.1	65.5	33.6***
(SD difference = 11.4; SE mean difference = 4.04; df = 7)			
	Contrast Class		
C-1	86	80	6
C-2	90	66	24
C-3	68	54	14
C-4	51	55	-4
C-5	68	66	2
C-6	60	43	17
C-7	91	78	13
C-8	75	64	11
Mean Score:	73.6	63.2	10.25*
(SD difference = 8.83; SE mean difference = 3.1; df = 7)			

* Significant at the .05 level of confidence.
*** Significant at the .001 level of confidence.

confidence for the experimental class and the .05 level for the contrast class (See Table 6 and Figure 8).

Supplementary Findings

In addition to the major findings, the following supplementary findings were recorded. Every student in the experimental class reduced his Activity Level Average by at least two-thirds of his pre-experimental score (Table 3). Similar results were obtained from the teacher evaluations on the Burks' Scale where there was a drop of at least 18 points for each child (Table 6). No child in the experimental class showed an increase in any maladaptive or hyperactive behavior in areas covered by the three rating instruments.

One of the more striking findings was the complete elimination of reinforcement of maladaptive student behavior by the experimental classroom teacher. During the post-experimental observation period, she was not once observed acting or responding in a way that would maintain or increase maladaptive behavior.

Comparisons of the Two Classes

The *t*-test for difference between uncorrelated means in two samples of equal size was used to determine if there was a significant difference between the two mean Activity Level Averages (ALA's) of the experimental and contrast class.

A comparison of the pre-experimental period ALA's showed that the contrast class displayed significantly fewer maladaptive behaviors than

similar analysis of the post-experimental ALA's revealed a significant difference in the opposite direction, i.e., the experimental class had fewer maladaptive behaviors than the contrast class ($\underline{t}$ = 10.34, df's = 15, $p > .001$). See Table 3 and Figure 6.

For the Sound Level Meter means of the two classes, the $\underline{t}$-test for testing a difference between uncorrelated means was used. A comparison of the pre-experimental period readings indicated that the contrast class displayed a significantly lower mean sound level than did the experimental class ($\underline{t}$ = 5.9, df's = 87, $p > .001$), whereas a similar analysis of the post-experimental period sound level means indicated a significant difference in the opposite direction, i.e., the experimental class had a significantly lower mean sound level than the contrast class ($\underline{t}$ = 15.5, df's = 93, $p > .001$). See Table 4 and Figure 7.

On the third instrument, the Teacher Observation Form, first the pre-experimental period scores, and then the post-experimental period scores, were compared using the Chi Square statistic. A comparison of pre-experimental period scores indicated that there was no significant difference between the two teachers (X^2 = .037, df = 1, $p > .80$), whereas post-experimental period scores were significantly different (X^2 = 74.45, df = 1, $p > .001$). The experimental teacher had decreased the ratio of reinforcement of maladaptive behavior to zero while the contrast teacher, who had had no explanation of operant techniques, had a behavior reinforcement ratio very similar to her pre-experimental period ratio (X^2 = .10). See Table 5.

On the Burks' Behavior Rating Scale, the $\underline{t}$-test for differences

between uncorrelated means in two samples of equal size were used to determine if there was a significant difference between the two classes. A comparison of pre-experimental scores indicated a significant difference (t = 6.79, df = 15, p < .001), i.e., the experimental class had significantly higher scores, suggesting more maladjustment. A similar comparison of post-experimental period scores indicated no difference (t = 0.7, df = 15, p > .05). Table 6 and Figure 8.

Changes Occurring During the Period of the Study

In addition to the reduction in maladaptive behavior reported above, a number of other changes occurred in the school setting while the study was in progress.

Schoolwork

The teacher estimated that the time spent on "seat-work" increased from less than 30 minutes to more than two and one-half hours per day. Her estimate of the academic progress of the boys is based on the comparison of the schoolwork they were doing before and after the study. She reported that all boys had made significant improvements in reading skills, in every case more than one month, in four cases more than one year, and in two cases more than two years; that all boys had improved in writing, with four becoming effective with cursive writing for the first time; that one boy had slightly improved in arithmetic, one improved, one much improved; and three boys had made dramatic improvement in arithmetic performance, one making about a year's progress, another

two year's progress, and another three year's progress. The teacher stated that all subjects had made more academic improvement in the 22 day experimental period than they had made in the entire school year up to the start of the study. Two boys, she believed, had demonstrated more progress during the period than they had made in their entire school history. One of these boys, E-7, was returned to a regular classroom for one hour per day at the start of the third week of the experimental period and continued to attend a regular class for increasing amounts of time until the end of the school year. He was one of the three boys who had been scheduled to be expelled from the class prior to this study.

Reduction in Self-Centered Thinking

As the study progressed the subjects became more concerned with what the class would earn in the experimental hour than with what each individual would receive. During the first week of the study, subjects who were "mad" at a classmate would often threaten to "mess" up the game for all. At first this threat was usually made once or twice each day by different boys but was not made by any student after the second week of the study.

On the playground, the teacher-aide reported an increase in spontaneous group activities such as in a game called kick-ball, which was played like baseball only using a soccer ball that was kicked instead of batted. Some of these games lasted the entire recess period with neither adult encouragement nor participation. Previous to that

time playground activities had usually been limited to individual play and at best games involving only two or three participants.

Another indication of a growing group awareness was the increase in the use of such words as "we," "us," "our class," etc., when talking with each other and while talking with adults. This change was noticed by all adults who worked with the class. Parents reported that their children talked more about "their class" and how different it was because they really worked and studied like other children. They also reported that their children talked about school at home where before they had seldom mentioned it.

Fighting and Aggression

Before the start of this study the teacher reported that fighting and other aggressive acts (e.g., throwing things, verbal threats, abusive language) against other children both in the classroom and on the playground occurred several times each day. This fact was also substantiated by the school principal. Students had been frequently sent home for uncontrolled fighting or aggressive acts or behavior or were kept in the school office for several hours each day. There was a steady decrease in fights and aggressive behavior during the study and in the final eight days no fights of any kind occurred either on the bus, the playground, or in the schoolroom.

Behavior on the School Bus

The teacher-aide, who rode regularly to and from school in the bus

which transported all educationally handicapped children in the three classes at the school, reported that during the course of the study, the bus behavior of all children improved. She reported that the experimental class children obeyed much better and were easier to control which in turn seemed to affect the behavior of the other children. The bus driver also reported that behavior had improved greatly although he emphasized that it "still had a long way to go."

Post-Experimental Period Behavior

A two month follow-up, in addition to weekly visits to the experimental class, showed that adaptive behavior had continued to improve. The teacher reported that she had observed no evidence of regression to former behavioral patterns other than an occasional short "relapse" which she was able to control. She also stated that all subjects had maintained their academic improvement and that one pupil (E-7) had advanced to a fourth grade reader from the preprimer level one he was reading at the start of the study. He was also spending upwards of two hours a day in regular classes. She felt that a definite class pride and cohesiveness was developing along with a continued growing concern for other students and the class.

The principal reported that the class was as quiet and orderly as any class in the school and that students of the experimental class sat quietly at their desks approximately three out of the four hours that they were in school. He reported that before the start of the study, he had been called to the room several times each day to quell a disturbance

or remove a child but that in the last two weeks of the study and the following six weeks he had not been called to the experimental classroom once because of a behavior problem. Only one child had been sent home during that period and that for a playground fight with a child in another class.

Three new students, all of whom had been diagnosed as extremely hyperactive and as severe classroom behavior problems, were placed in the class the Monday following the termination of this study. The teacher reported that none of those students ever disrupted the classroom procedure, and that they very quickly fell into the routine of the class. A substantial and consistent drop in hyperactivity in all three was noted.

Home Behavior

This section is based upon the results of the parent questionnaire, parent comments at a post-experimental period, regular parent's meeting, and personal communication between parents and the writer.

Without exception, every parent whose child had been in the experimental class reported improvement, and generally a very dramatic improvement, in their child's behavior at home. The reduction in hyperactive and maladaptive behavior found in the classroom also was evident in the home situation. The most common comment from parents was to the effect that the child was able to sit quietly much longer than previously. Improvements in other behavior was noticed, e.g., the child obeyed better, did not cry as much, had fewer temper tantrums and

aggressive outbursts.

The stepfather of one subject who had been scheduled for exclusion from school prior to the study but who was under consideration for regular class placement at the termination of the study, attended his first parent's meeting to tell of the boy's improvement at home and his decision not to sue the school district for his son's condition.

The mother of subject no. E-7, a boy who had been under intensive psychiatric care and who also had been scheduled for exclusion from school because of his classroom behavior and aggression, wrote as follows:

> He is more patient when he has to wait his turn to speak. Just more pleasant all around. Can occupy himself for much longer periods than ever before. . . Of course he is proud of his progress and the fact that he can spend some time in a regular classroom. The hardest thing for (S) to do was to wait his turn in anything and not speak out or make noises for attention. His improvement has been of tremendous help to him.
>
> Also his reading abilities have made such strides that he is now proud to bring hom a book or work to do and is also able to help his 1st grade sister with her work.
>
> He can sit and play Monopoly with his sisters and not get so impatient. Also is attempting scrabble with his 1st grade sister, but not ready to try it with his older sisters yet.

The mother of subject no. E-2, a boy who had had severe behavior problems throughout his school career, wrote the following on the Parent Questionnaire:

> When he wants your attention he raises his hand instead of hollering it out or interrupting . . . Likes school now more than when he started it this year and is trying to learn more about how to count and read than before. Although to sit down and read for any length of time is still out of the question, (S) seems more affectionate and more inquisitive. He asks me about adding and if he hears a word he doesn't know he asks what it means. Also, he tries to add money. (S) is a bed wetter and I've noticed that his bed has been dry more frequently than before the tests.

> I'm happy to have been able to see the results of these tests (Report by writer to Parent's Meeting). They all were favorable as far as (S) goes. I think we would have seen more improvement if (S) hadn't got his finger hurt and could have been in the whole time. I want to thank you for the chance to have been part of it and also, for the improvement it's made in (S).

Appearance of New Undesirable Symptoms or Behavior

One question that gave considerable cause for concern before the start of the study was what would happen when maladaptive behavior was extinguished. For example, would new symptoms occur in other areas or would aggressive acts and hyperactive and maladaptive behavior increase outside the school setting in accordance with traditional dynamic models of emotional disorders (Krasner and Ullman, 1965, pp. 2-9). The teacher, principal, school nurse, and other guidance and school personnel were requested to watch for any new symptoms or new behavior disorders and to immediately inform the writer if any were observed. The Parent Ouestionnaire was worded specifically to elicit any information about any new symptoms or undesirable behavior that might have occurred. Parents also were asked specifically and individually if they had observed any such behavior or symptoms since the start of the study.

The writer did not observe any new symptoms or undesirable behavior during the study, nor did any parent, teacher, or other adult report any such behavior. Rather, the opposite pattern emerged as previously reported--as school behavior improved, the behavior of the students improved in other areas as well.

Contrast Class Data

The contrast class teacher reported (personal communication) that she believed that her class had been making improvement at a constant rate all year and that such improvement as occurred in her class during the experimental period was about what she had expected. She did believe that the presence of the experimenter in her classroom each day was definitely a factor in the reading improvement of two boys with whom he had frequently worked. She also reported that the presence of a man (the experimenter) who participated in games during the physical education-recess period was of positive value in encouraging the children to play more as a group.

The school bus driver and regular teacher-aide reported improvement (as discussed above) in bus behavior which they felt was mainly due to the improvement of the boys in the experimental class.

In the post-experimental period parent meeting there were no reports of dramatic improvement from contrast class parents similar to those from all experimental class parents who attended the same meeting.

Summary

This study was concerned with the extinction of maladaptive behavior of students in a public school classroom for educationally handicapped children. More specifically, it sought to determine whether operant conditioning techniques, similar to those used and developed by behavior therapists (Wolpe, 1958; Eysenck, 1960; Allyon and Michael, 1959; Staats and Staats, 1963; Staats, 1964; Krasner and Ullman, 1965)

for use with individual adults and children could be extended to use with a-class-as-a-whole in a classroom of children with severe behavioral disorders.

It was hypothesized that, as a result of the use of operant techniques, several measurable changes would occur in classroom and individual behavior. First, it was hypothesized that there would be a measurable decrease in teacher disapproved, or maladaptive, behavior after the experimental period. It was hypothesized that there would be an increase in adaptive behavior and a decrease in maladaptive behavior as a result of the application of operant techniques.

The second hypothesis was concerned with the background noise or activity level of the room and predicted that a decrease in sound level would occur as a result of the use of operant techniques. If maladaptive behavior could be reduced it appeared that a consequent result would be a quieter and less noisy classroom.

The third hypothesis dealt with the use of operant techniques by the teacher. It was predicted that as she became aware of her part in reinforcement of maladaptive behavior she would systematically reward adaptive behavior while ignoring or refusing to reward maladaptive behavior.

Lastly, it was hypothesized that there would be a reduction of hyperactive and maladaptive behavior in the total school setting as a result of operant techniques used in this study. It was predicted that the teacher would observe such a decrease which would be reflected in her observations and evaluations.

Thus, the major purposes of this study were to determine whether

the systematic application of operant techniques in a classroom would result in (1) a reduction of maladaptive behavior in the classroom, (2) a reduction of the noise level in the classroom, (3) a reduction in previously teacher-reinforced maladaptive behavior, and (4) a reduction in hyperactive and maladaptive behavior in the total school setting.

Methodology

The above purposes were met by the utilization of a minimum experimental period of one hour daily for 22 consecutive school days. During the daily experimental period, students played a "game" where they were rewarded with candy or pennies when no member of the class committed any maladaptive behavior for a specified time interval. If maladaptive behavior occurred, the large stop-clock which was used to time the intervals was stopped and returned to its starting point and then restarted as soon as the class became quiet or the maladaptive behavior ceased. The class was started on 20-second intervals which were increased gradually to 10-minute intervals by the end of the third week. The teacher was instructed to reward freely any adaptive behavior and to ignore any maladaptive behavior. At the conclusion of each daily period, the reward earned was divided equally among the children present. Children could exchange pennies for candy, take the money home with them, or place it in a "bank" operated by the writer. All subjects were saving their money by the termination of the experiment.

No instructions were given to the teacher on subject matter used during the daily period and she used both individual and class instruction

on numerous topics.

Data Collection and Analysis

Baselines for the occurrence of maladaptive behavior in the class were obtained by having three judges rate the experimental class and a contrast class over a three day period on an Activity Check List. A Sound Level Meter was used to establish the mean sound level of the two classes. Teacher reinforcement of both adaptive and maladaptive behavior was recorded on a Teacher Observation Form. The two teachers were asked to rate the total school behavior of each student in their respective classes on the Burks' Behavior Rating Scale.

Following the 22-day period the same procedure was followed with the same judges and teachers. Pre- and post-experimental scores were compared. Each class was compared with itself in order to test the null hypotheses since the contrast group was not a true control group. The purpose of the contrast class was to determine the effect of the presence of the experimenter on the children and whether the contrast class would show similar progress with the presence of the experimenter but without the use of systematic operant techniques.

Subjects

The sample consisted of two special classes for educationally handicapped children located in an elementary school in California. All children in both classes had been excluded from regular classes because of severe behavior disorders and learning difficulties. All

in the experimental class had been classified as hyperactive and all but one had been excluded from their regular class because of their disrupting behavior in class. The experimental class was composed of eight boys of normal or above intelligence, between the ages of 8.8 and 10.6. They were all Caucasian. The contrast class was also composed of eight children, five boys and three girls, of normal or above intelligence and ranging in age from 7.3 to 10.10 years. Four of the eight had been described as hyperactive. All were Caucasian.

Major Findings

Four research hypotheses were developed from the general hypothesis that the use of operant techniques can be extended to an entire class of educationally handicapped children to improve classroom behavior.

Hypothesis I-- predicted that the use of operant techniques would result in the reduction in the occurrence of maladaptive behavior. This prediction was supported by the data in every analysis that was performed.

There was no significant change in occurrence of maladaptive behavior in the contrast class during the same period.

Hypothesis II--predicted that the use of operant techniques would reduce the noise level of the class. This hypothesis was strongly supported by the data.

There was no significant difference in the pre- and post-experimental sound levels of the contrast class.

Hypothesis III--predicted that the systematic application of operant techniques by the teacher would result in less reinforcement of maladaptive behavior. This hypothesis was supported by all analyses of the data. The analysis of the data on the contrast class showed no change in the rate or amount of reinforcement of adaptive and maladaptive behavior.

Hypothesis IV--predicted that there would be a reduction in maladaptive behavior in the total school setting as a result of the use of operant techniques in the experimental period. This hypothesis was strongly supported by data. Data reported by the contrast class teacher were significant at the .05 level but not the .01 level.

Supplementary Findings

In addition to the findings related to the research hypotheses, the following observations were recorded for the experimental class:

1. Every student reduced his pre-experimental period Activity Level Average by at least two-thirds in the post-experimental period.

2. Teacher evaluations on the Burks' Behavior Rating Scale showed that all subjects had reduced their pre-experimental period score by at least 25 percent.

3. There was no increase in maladaptive behavior by any subject on any scale.

4. There was a total absence of teacher reinforcement of maladaptive behavior during the post-experimental observation period.

Additional Findings

Additional analyses of the data reported on between-class comparisons of the two classes:

The activity levels of the two classes as measured on the Activity Check List showed that the contrast class had significantly less maladaptive behavior than the experimental class before the start of the study. Post-experimental period observations indicated that the position had reversed: the experimental class had significantly less maladaptive behavior.

Sound Level Meter readings indicated the contrast class was significantly quieter in the pre-experimental period but the experimental class was significantly quieter in the post-experimental period.

Ratings of the two teachers show no differences in their rate of reinforcement of maladaptive and adaptive behavior in the pre-experimental period. In the post-experimental period, however, the experimental teacher was significantly different--she did not reinforce a single instance of maladaptive behavior while being observed. The contrast teacher's rate of reinforcement was similar to her previous rate in the pre-experimental period.

On Burks' Scale the ratings of the teachers showed that the contrast class had significantly lower ratings before the start of the study. In the post-experimental period the two classes both had lower scores but the experimental class had the greatest reduction in scores and was rated equal to the contrast class.

Collateral Findings

In addition to findings from the above systematic data, other collateral findings based on experimental and post-experimental period follow-up observations of children in the experimental class were reported:

1. There was a substantial improvement in quantity and quality of schoolwork, academic achievement, and personal attitudes toward school of all subjects in the experimental class.

2. There was a decrease in self-centered thinking and an increase in group concern and involvement by every child.

3. There was a marked decrease in fighting and aggressive acts by all children in the experimental class.

4. Behavior on the school bus was substantially improved.

5. The above findings were maintained during the balance of the school year--a period of 10 weeks.

6. Behavior at home was improved and maladaptive behavior was reduced.

7. There were no manifestations of any adverse effects or symptom substitutions in any student involved in this study.

Discussion

The results of this study have supported the general hypothesis that maladaptive behavior in a classroom for educationally handicapped children can be reduced. The data shows that all four singular hypotheses were supported well beyond the .001 level of confidence while in all but one

instance, there was no significant improvement in a contrast class.

This study has demonstrated that hyperactive and maladaptive behavior of boys who are either physically normal and/or who had neurological impairment can be altered and reduced through systematically applied techniques of behavior modification. Indeed, the impressions of school personnel and the experimenter of the subjects in this study was that there was no obvious difference between normal and neurologically impaired boys in their rate of improvement, nor could any difference be detected on the instruments used. The experiment sought to define a certain type of maladaptive behavior, observe it, and then modify it in the manner described by Ferster and DeMeyer (1961).

Patterson, Jones, and Whittier (1965) hypothesized that hyperactive behavior resulted in an aversive effect upon other people; that the child with hyperactive or maladaptive behavior may well be seldom, or never, rewarded for acceptable behavior when he does produce it. This hypothesis seemed to also apply with the boys in this study: the behavior they emitted was not so much "wrong" as simply excessive or inappropriate for the situation. A child wanting help, for example, might call out to the teacher or run to her desk and interrupt whatever she was doing to seek aid instead of sitting quietly at his desk and holding up his hand until appropriately recognized.

Patterson and Anderson (1964) and Ferster and DeMeyer (1961) have also pointed out that the teacher may not be a reinforcing agent to many of these children and her praise or approval is not reinforcing and may even be adversive to the child. This situation also existed for some

of the boys in the class who were often quite unresponsive to any attempts on the part of the teacher to use verbal methods of control. The three boys who were to be excluded, for example, were frequently unresponsive to any method of control other than physical restraint.

This experiment sought to establish an optimum setting wherein all children would be rewarded for emitting adaptive, socially acceptable behavior. They were paid with token rewards--money, with which they could do as they saw fit. Another purpose of the study was to couple the token reward with systematic teacher social and verbal reinforcement given at the same time, and as much as possible, during the experimental period, i.e., the teacher was rewarding the same behavior the child was being paid to perform. She made no comment about the experiment and pretended not to notice it. Her function was to create a situation wherein adaptive behaviors of all boys were constantly and conspicuously reinforced while at the same time she completely ignored and did not reinforce maladaptive behavior.

The Lott and Lott (1960) study suggested that if the pupils in a class experienced success and social approval in the presence of other pupils, positive feelings toward the other class members would increase and negative or aversive attitudes would decrease. Their study also suggested that if a situation could be created where the students worked together successfully and all were rewarded, a group cohesiveness or esprit de corps would develop. This experiment required all boys to cooperate and work together in order to win or earn money and that situation quickly resulted in disapproval of any maladaptive behavior

and mutual approval for good behavior. Response substitution took place as a child learned new ways to be rewarded in place of previously emitted maladaptive ways which were no longer effective or rewarded.

Reward

There were three main sources of reward in the experimental period: (1) from the teacher, (2) from peer approval and support, and (3) from token reinforcement given by the experimenter. There was also what might be termed a generalized reward of "achievement" which developed as the boys became interested in their academic progress. Patterson (1965) has suggested that in many cases the deviant child has a behavior disorder because certain avenues for reinforcement are not open to him. In this study it was observed that in many instances neither teacher nor peer approval had been reinforcing before the start of the experiment. However, during the experiment as maladaptive behavior decreased there was a very obvious change in interpupil behavior and class opinion came to exert a definite influence on every child. The coupling of social reinforcement with the token rewards also resulted in an increasing effectiveness of verbal reinforcement alone.

Contrast Class

Because of the nature of the study, support for the hypotheses was derived from pre- and post-experimental comparisons of the same class. However, comparisons made between the two classes also strongly support the hypotheses. On the two measures in which both classes were scored

by three judges common to both classes in the pre-experimental period, the contrast class had a much lower Activity Level Average and a much lower room sound level. The difference was significant beyond the .001 level of confidence. On the between teacher ratings there was no difference. In the post-experimental period the situation was reversed: the experimental class was far lower on both measures than the contrast class. The difference was significant at the .001 level. The experimental teacher had reduced her reinforcement of maladaptive behavior to zero while the contrast teacher still reinforced maladaptive behavior in the same proportion. On the Burks' Scale, an instrument used by each teacher to rate her own class, the mean of the contrast class was far lower (at the .001 level) than the experimental class before the study period, but the means were equal at the end of the study. Both had made significant improvement. Part of the improvement of the contrast room on the Burks' Scale, which reported total school behavior, undoubtedly reflected the behavior change in the experimental room. The children in the three classes rode to school together, were in adjacent classrooms, played together at recess, and frequently had joint activities together; and the boys in the experimental class, being older, usually set the "tone" of any activity in which all were involved and were generally the leaders in disruptive activity.

Matching of Groups

Shortly after the idea of this study was formulated it was determined to attempt to eliminate some of the strong criticisms Bettleheim (1963)

had leveled at the Haring and Phillips (1962) study of emotionally disturbed classes. Bettleheim was particularly critical of the method of selecting and matching the experimental and control groups:

> Irrespective of the nature of the groupings, one might surmise that whatever method Group I was taught by -- being much younger, being in classes about half the size of Group III, having known defeat only half as many years--their academic and behavioral progress would be better than in the other two groups. (p. 333)

He was also critical of the method of parent conferences with experimental class parents while none were undertaken with the control group parents.

In the first discussion with the director of the School District for permission to do this study, the experimenter specifically requested that the study be done with the class containing the most severely maladjusted and hyperactive children of the 13 classes for educationally handicapped children in that district. The class selected contained three boys who had been processed for exclusion from school because they were unmanageable. The contrast class had none. The experimental class had a mean age of 9.5 and a mean of 13.2 months since placement in the EH program; the mean age of the contrast group was 8.7 and mean length of time since placement, 9.7 months. Thus, the experimental class was older, exhibited more maladaptive behavior, and had been in the program much longer; it had had far more time to "know defeat," both in life and in school. Also, at the start of the experiment, it was composed of nine boys to eight boys and girls in the contrast class. One boy dropped out when his family moved to another district leaving the

classes exactly matched on size until the third week when a ninth student was placed in the contrast class: a very quiet withdrawn girl. The last criticism, that Haring and Phillips worked with one parent group only, was met in this study by the experimenter appearing before a parent-group meeting held for parents of all three classes once each month and explaining the purpose of the study. All parents were equally informed and no attempt was made to contact or work with any parent or parents in the study. Following the study, the experimenter again met with all parents to discuss the findings.

The specific purpose of the matching of these classes was, in fact, to "stack the cards" against any chance of showing a significant improvement when the two classes were compared. After the conclusion of the study, it was the opinion of the members of the district guidance office who had observed the class that the experimental class had become one of the best behaved, if not the best behaved, of all EH classes in the district.

Generalization of Behavior Change

Observations and impressions of parents and school personnel were also collected in an effort to determine whether any generalization of adaptive behavior had occurred outside the experimental period and outside the classroom. There was unanimous agreement among school personnel that a dramatic change in overall behavior had occurred; and every parent reported a substantial improvement in behavior, two reported a very dramatic change. Parents reported many instances of specific improvement

that took place in other areas as the study progressed. For example, a decrease in enuresis, improved sibling relations, less fights, improved table manners, and less hyperactive behavior in all situations.

To summarize, behavior was modified in all children in the experimental class as had been predicted from learning theory: concrete reinforcement of specific behavior increased its occurrence while competing maladaptive behavior was decreased. As children became successful and were rewarded in school, expressions of liking and approval became more frequent and anxiety and dislike decreased, as predicted by Wolpe's theory. Finally, in every instance, behavior that was systematically rewarded increased and behavior that was not rewarded and made non-reinforcing to the person emitting it decreased, as predicted by operant conditioning theory.

Conclusions

The following conclusions relative to the problem under investigation are suggested by the evidence provided within the limits of this investigation, and in relation to previous research findings pertinent to the same problems:

1. The use of operant conditioning techniques can effectively reduce the occurrence of maladaptive behavior in a classroom for educationally handicapped children.

2. Maladaptive behavior of individual children can be defined, observed, and specifically extinguished within the framework of normal classroom procedures.

3. As behavior improves in the classroom, the improvement will generalize to other school situations such as playground behavior and bus behavior.

4. As maladaptive behavior decreases, academic progress increases.

5. As the classroom becomes a source of satisfaction, success, and reward; dislike, hostility, and anxiety toward the school environment will decrease.

6. A classroom teacher can effectively apply operant conditioning techniques to shape behavior in the course of daily teaching and can be taught how to reduce substantially the occurrence of maladaptive behavior by (a) ignoring it and/or not rewarding it and (b) strongly reinforcing competing adaptive behaviors systematically.

7. It is unnecessary to use dynamic theories of personality to reduce, or explain, maladaptive behavior.

8. The elimination of maladaptive behavior does not result in the emergence of other unacceptable responses; rather, the opposite appears to take place: a decrease in other types of maladaptive or neurotic behavior.

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ERIC REPORT RESUME

Resume Date	Is document copyrighted?	Yes
July 1971	ERIC Reproduction release?	Yes

Title: The Use of Behavior Modification Techniques With a Special Classroom for Children With Behavior Problems

Personal Author: Hotchkiss, James M.

Institution (Source): University of Oregon, College of Education, Eugene, Oregon

Publication Date: July, 1971

Contract Number: USOE Grant No. OEG-0-9-470117-3664(721)

Pagination: 69

Abstract:

This study investigated the application of operant conditioning techniques now used in the therapy of individuals to class groups. The general hypothesis was that the use of operant techniques in a classroom for educationally handicapped children would result in a reduction in maladaptive behavior.
Subjects. The subjects included all children enrolled in two of three special classes for educationally handicapped children in one elementary school, one class used as the experimental class and the other as a contrast. The age range of the experimental class was 8.8 to 10.6 years; the contrast class, 7.3 to 10.10. The I.Q. range of the experimental class was 88 to 119; the contrast class, 88 to 132. Four experimental class S's had medically diagnosed brain impairment, and three others were questionable. Three S's had been scheduled for exclusion from the school prior to the study. All were considered hyperactive.
Procedure. The experimental period required twenty-two consecutive school days. During the experimental hour, the observer watched the class from one corner of the room where he operated a stop clock. If no unapproved behavior occurred during a specific time interval while the clock was running, the class was given one penny. If any maladaptive behavior did occur, the clock was stopped, reset and started again when all behavior was acceptable. At the end of the experimental hour, the money won was evenly distributed among the class. S's were allowed to buy candy, put their money in a "bank" or take it home with them. During the hour the teacher ignored all maladaptive behavior and attempted to reward all the adaptive behavior of every child she observed. For statistical treatment each class was used as its own control, the post-experimental period scores on various instruments being compared with the pre-experimental.
Major Findings. (1) There was a significant reduction in the occurrence of maladaptive behavior in the experimental classroom. (2) A significant reduction in the background sound level of the experimental class was recorded. (3) There was a significant decrease in teacher-reinforcement of maladaptive behavior. (4) There was a significant reduction of hyperactive and maladaptive behavior in the total school setting. (5) Similar findings did not obtain in the contrast class.

Collateral Findings. School work of all experimental children showed substantial improvement. Group interaction improved and self-centered behavior decreased. There was a marked decrease in aggression and fighting, and behavior on the school bus was substantially improved. All parents reported improved behavior at home. There were no manifestations of any adverse affects or symptom substitutions in any child, and the improved behavior was maintained for the balance of the school year.

Conclusions. (1) The use of operant conditioning techniques can reduce the occurrence of maladaptive behavior in a classroom for disturbed children. (2) Maladaptive behavior of individual children can be defined, observed and specifically extinguished within the framework of normal classroom procedures. (3) Improved behavior in the classroom situation generalizes to other school situations such as playground, bus, etc. (4) As maladaptive behavior decreases academic progress has a chance to increase. (5) A classroom teacher can effectively apply operant conditioning techniques in shaping behavior in the course of her daily teaching. (6) It appears unnecessary to refer to any underlying causes in order to decrease maladaptive behavior. (7) The shaping out of maladaptive behavior does not result in the emergence of new symptoms, rather, the opposite appears to take place. (8) Regardless of the home environment, deviant behavior in the school environment can be reduced by the classroom teacher.